

# Tracking and analyzing dynamic changes of cell shapes and spreading

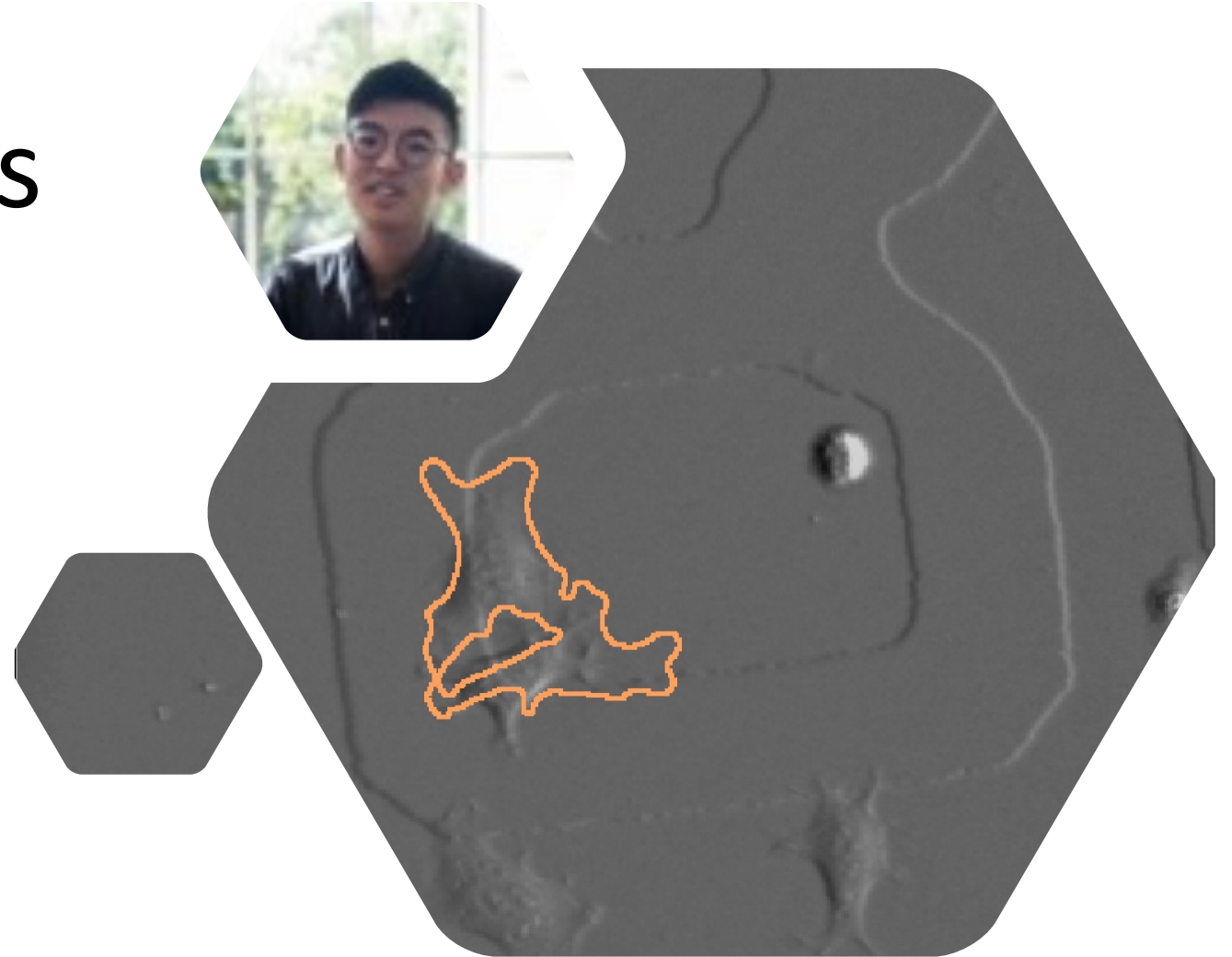
Student:

Dingyuan Liu, Statistics and operation research

Faculty advisors:

Ronit Freeman, Applied Physical Science

Kyle David Riker, Applied Physical Science

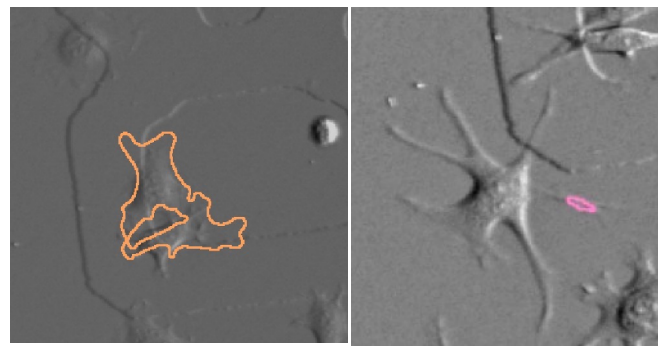


## Research question:

How to utilize statistical and image processing tools to capture cell shapes and behaviors in a video.

## Research question's importance:

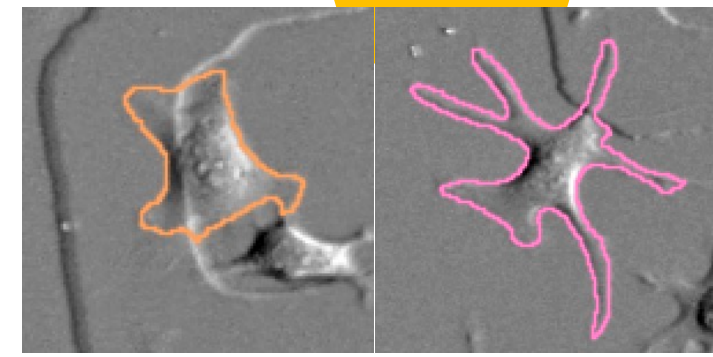
Automation of step 1 and manual corrections of step 2 provide accurate analysis of cell areas.



Examples of poor outlines from automated segmentation



Step1:  
refining  
outlines

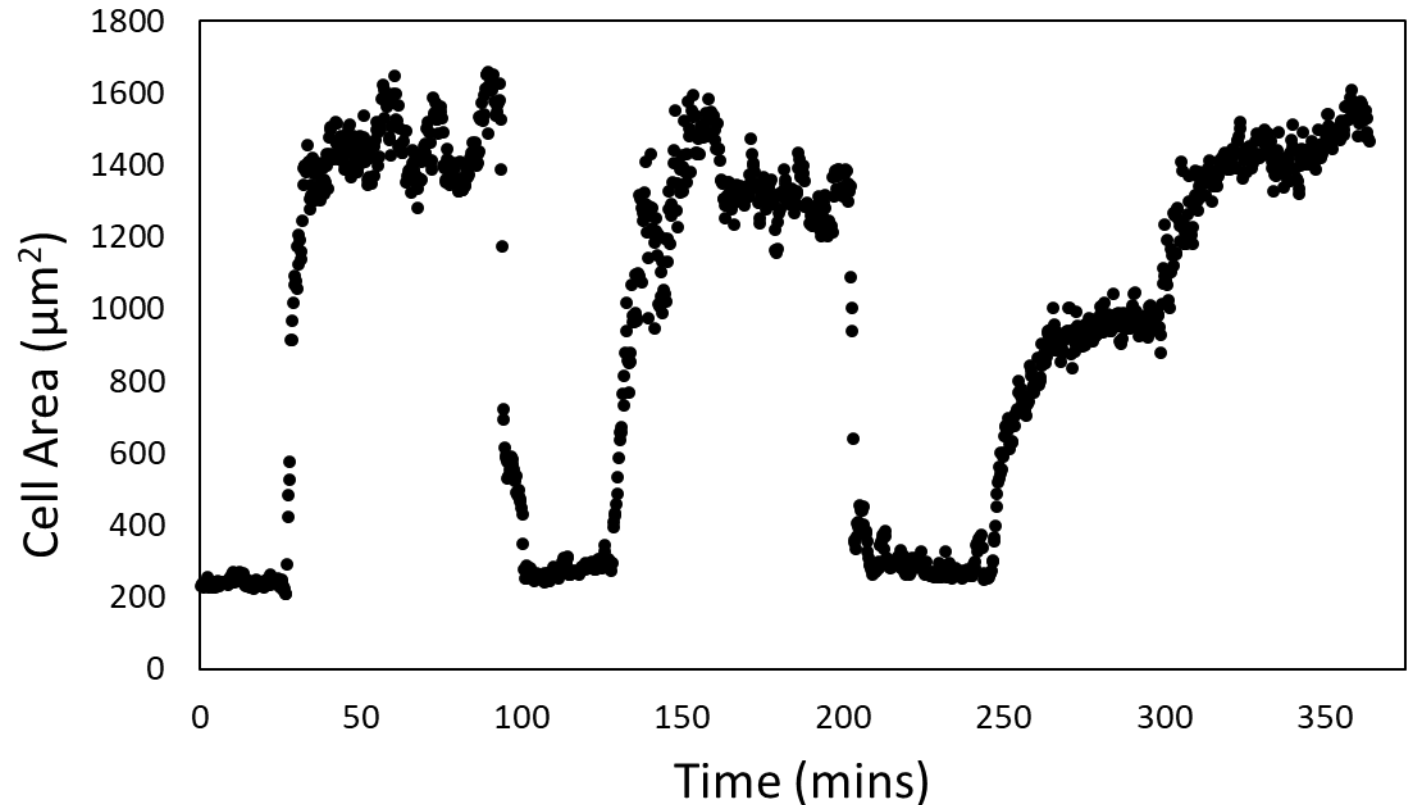


Examples of sound manual refined outlines



Step 2: plot fitting

Plot of Cell Area V.S. Time



## Result:

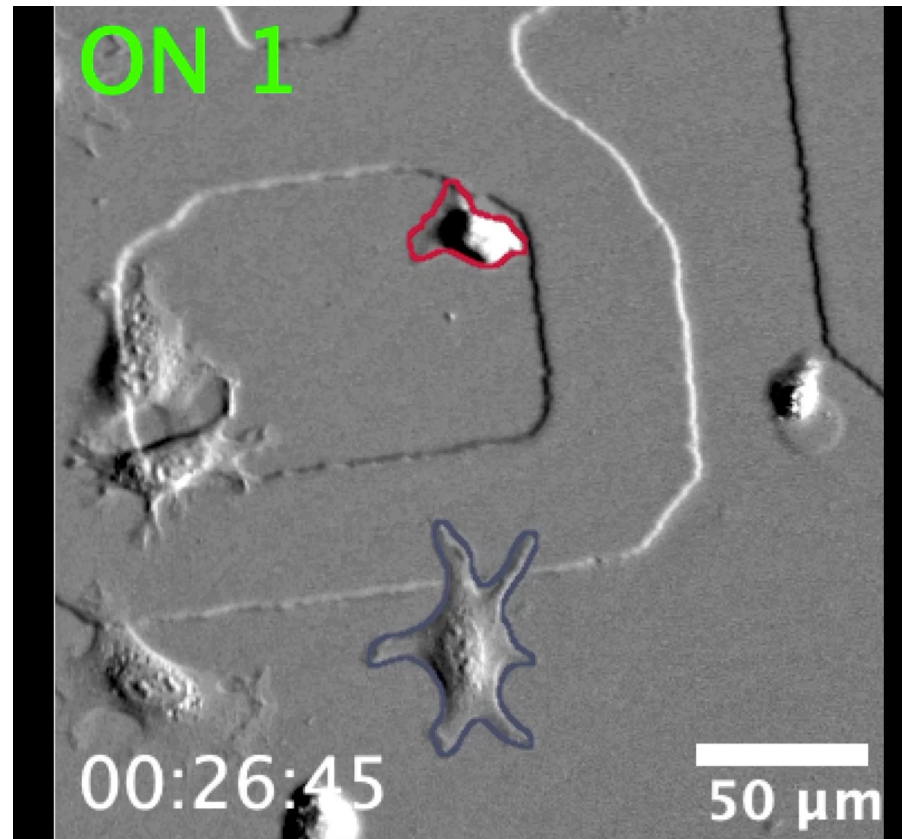
Illumination methods from CellProfilers maintain a constant brightness and contrasts in the video. Outline produced by Fiji with manual calibration yield accurate cell's area values for further data analysis or curve fitting (shown in Figure 1 and video1)

## Importance for research community:

Calculation of cell growth rate can be more accurate and intuitive, while change in shape can be visible and throughout.

## Importance for general public:

Shed light on potential future applications in medicine developments.



Video1: Final processed overlay outlines

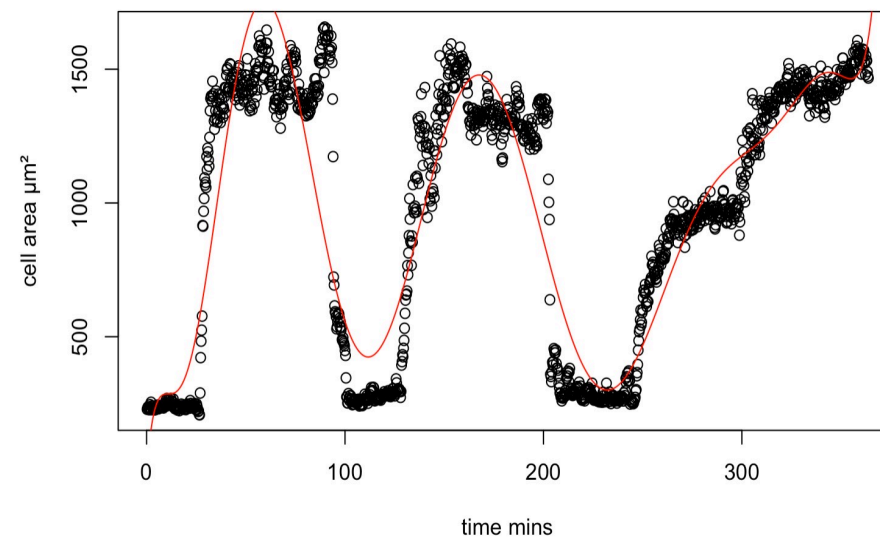


Figure 1: fitted curve on scatter plot